FCC FTTx & TRO Overview

January 23, 2004

Gary Bolton VP Marketing

Doug Cooper Director Regulatory & Mkt Dev

Catena Company Overview

R&D Campus

- Founded in December 1998

- 260 Employees

- Raleigh, Ottawa, Beijing offices

- Incumbent Supplier to Top 3 North American Carriers

- Over 5000 systems in service

- Shipped 80,000 ports of DSL in 4Q

- Company is Profitable

Triennial Review Order (TRO)

- **Real Life Impact of Broadband Decision**
  - RBOCs respond by deploying more packet technologies
  - Verizon vocal about commitment to deploy broadband & fiber
  - CLECs looking at deploying Integrated POTS + DSL Solutions
    - Transition from UNE-P to UNE-L, to offer bundled package
    - Sales of Integrated POTS + DSL equipment to Independents executing "edge out" strategy to compete in neighboring RBOC territories
    - True facilities-based competition will benefit consumers
- **Right Decision at the Right Time**
  - Vendors stabilize, start getting orders, develop new products
  - Consumer appetite for access to digital content, new applications continued to grow and also helped the US economy
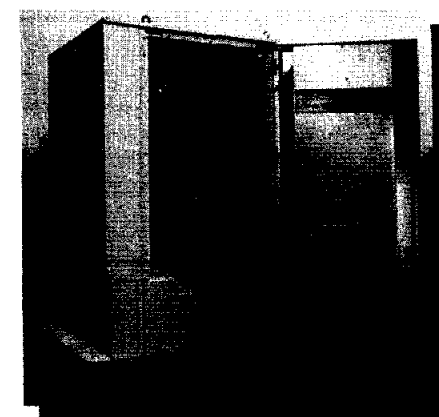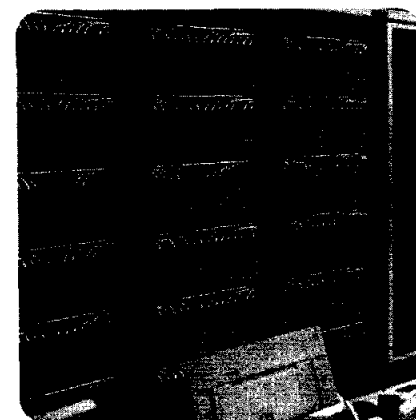
CATENA NETWORKS

Triennial Review Order (TRO)

- ## Different Strategies for Different Carriers
  - Network upgrades and convergence takes time, but should be driven by technology, operations management and cost
  - DSL upgrades continue, consumers have more choices
    - Video over DSL (though not at capacities as in Deep Fiber plant)
    - Telcos offer service bundle discounts, tiered offerings
    - DSL prices drop dramatically
    - Cable responds by increasing capacity
  - Deep Fiber Solutions
    - Fiber to the Home, Fiber to the MDU, Fiber to the Curb
    - Customer service set will be transparent – and it's all Customer Driven
    - The same access platform allows telcos to deliver any and all of the above from the same platform – DSL, FTTH, FTTX
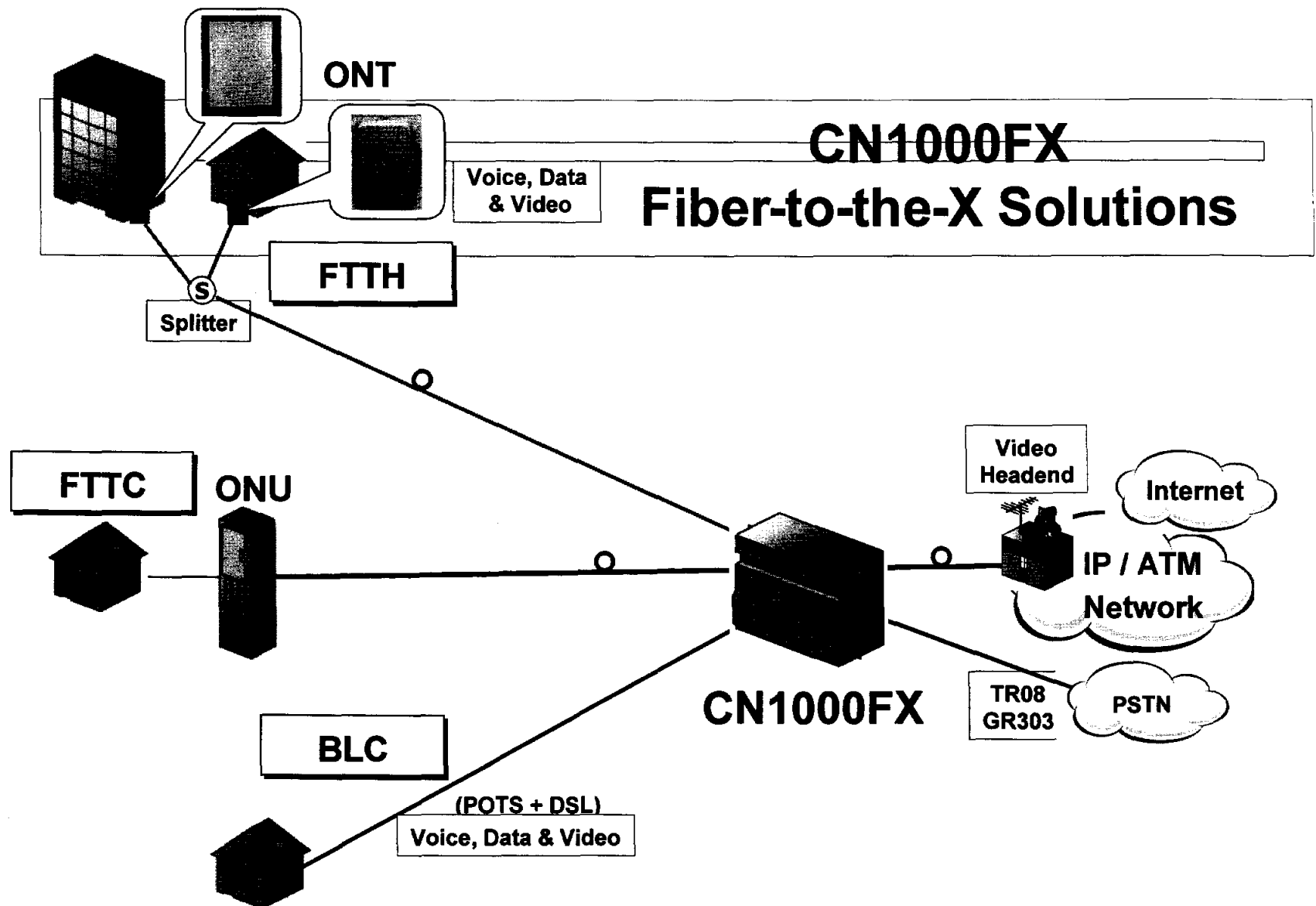
CATENA NETWORKS

CN1000 - Broadband Loop Carrier
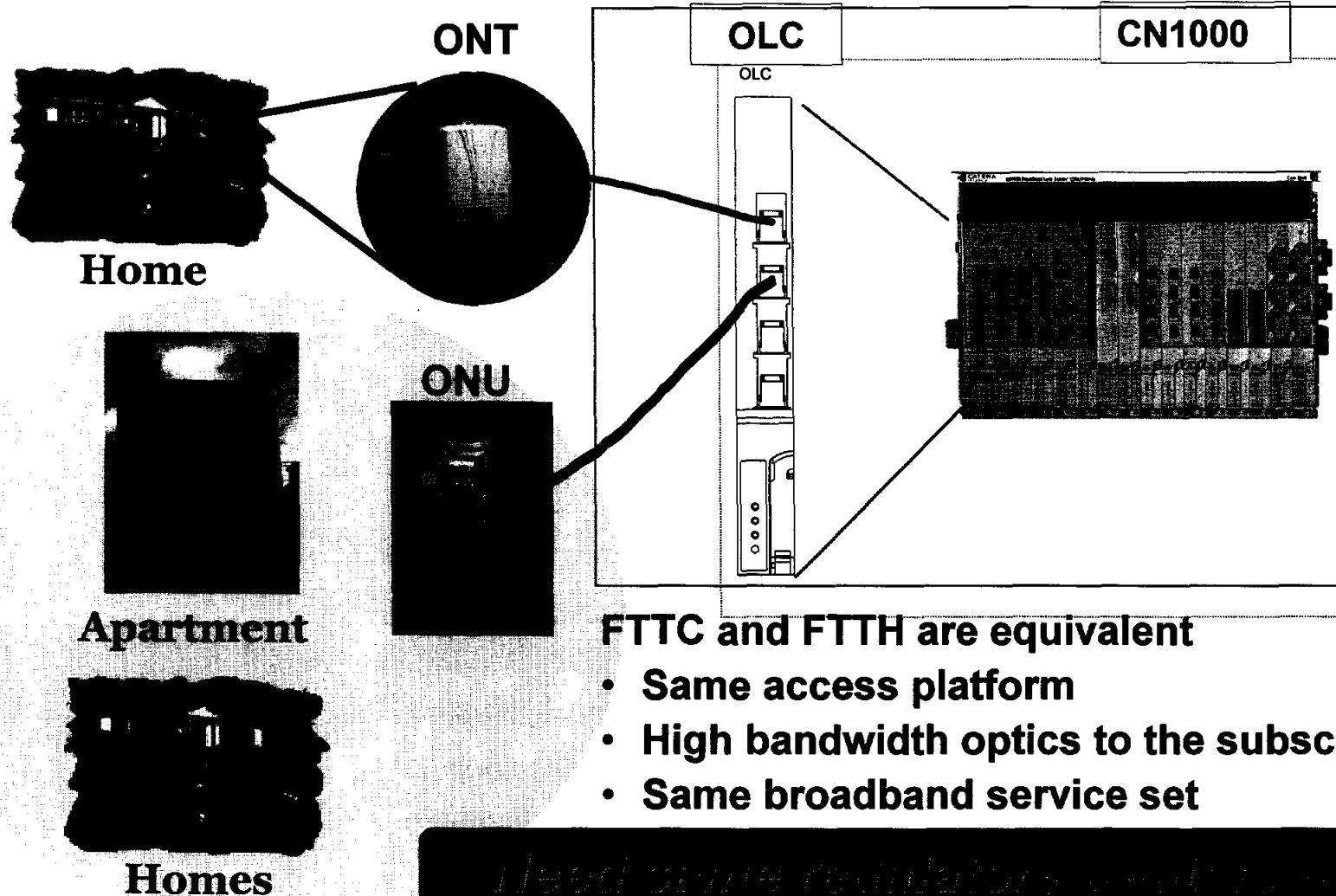
Performs the functions of:

- **Voice Gateway (DLC)**
  - Backward compatible, future proof
- **Voice over Packet Media Gateway**
  - H.248 & MGCP interfaces to Softswitch

- **DSLAM**
  - World class DSL performance
  - High density & full QoS
- **Fiber Distribution Host**
  - FTTH/PON
  - FTTC
- **Switched Digital Video Distribution**
  - over ADSL or Fiber (SDV & RF Video)

ONT

CN1000FX
Fiber-to-the-X Solutions

Voice, Data & Video

FTTH

Splitter

FTTC   ONU

Video Headend

Internet

IP / ATM Network

CN1000FX

TR08 GR303   PSTN

BLC

(POTS + DSL)
Voice, Data & Video

NETWORKS
CATENA

Broadband Optical Line Card

ONT

Home

ONU

Apartment

Homes

OLC

OLC

CN1000

FTTC and FTTH are equivalent
- Same access platform
- High bandwidth optics to the subscriber
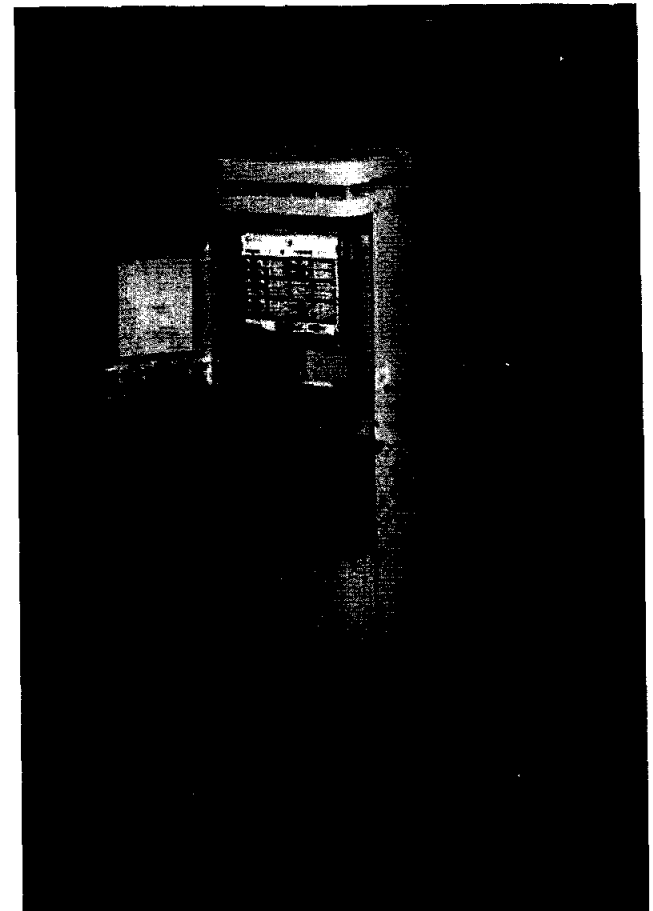- Same broadband service set

NETWORKS
CATENA

ONU Functionality

- **Service Capabilities**
  - 24 POTS lines
  - ADSL, ADSL 2+, G.SHDSL, VDSL, etc.
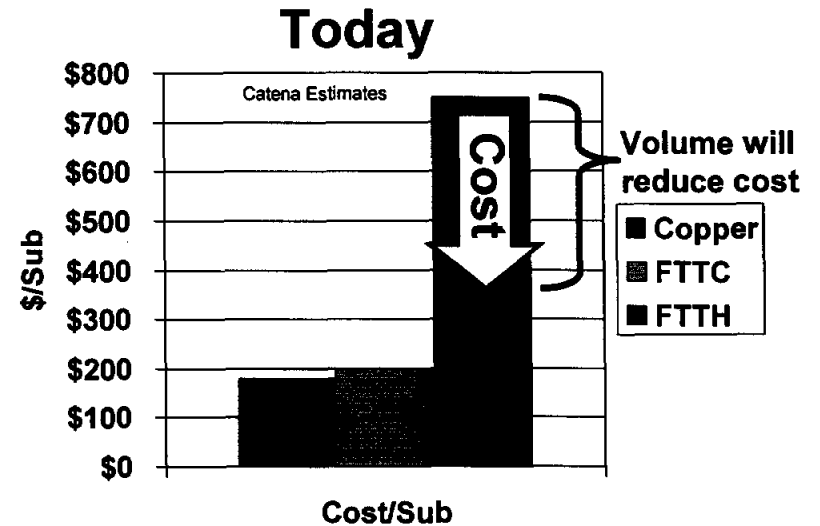 - Special services
  - Video

- **Enclosure Capabilities**
  - Protection and termination
  - Fiber and copper splicing location
  - Bonding/grounding
  - Single Family, MDU and wall mount
    - Buried
    - Aerial
  - Thermal management
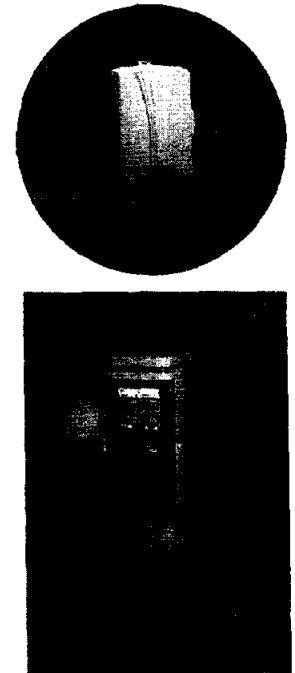 - Flood resistance

CALERA NETWORKS

Economics of Access Technologies

- **Copper**
  - Electronics amortized over 9-18Kft serving area
- **FTTC**
  - Electronics amortized over 10-12 living units (homes)
- **FTTH**
  - Electronics (ONT) amortized over single (1) living unit

Today

Chart showing Cost/Sub ($/Sub) with a large downward arrow labeled "Cost". Y-axis ranges from $0 to $800. "Catena Estimates" noted. Legend: Copper, FTTC, FTTH. Annotation: "Volume will reduce cost".

CATENA NETWORKS

Catena Fiber Summary

- **FTTC and FTTH delivered (simultaneously) from same access platform**

- **FTTC and FTTH provide the same broadband service set delivery to consumers**

- **FTTC is more economical in many deployment scenarios today**

- **Broadband solutions must be economically viable based on network topography**

- **Rules shouldn't choose technologies**

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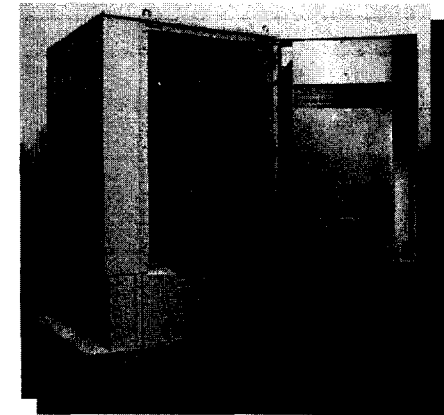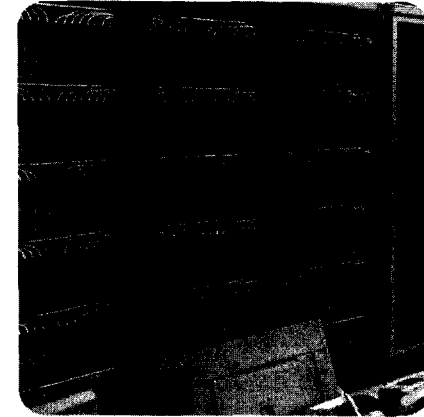
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CATENA

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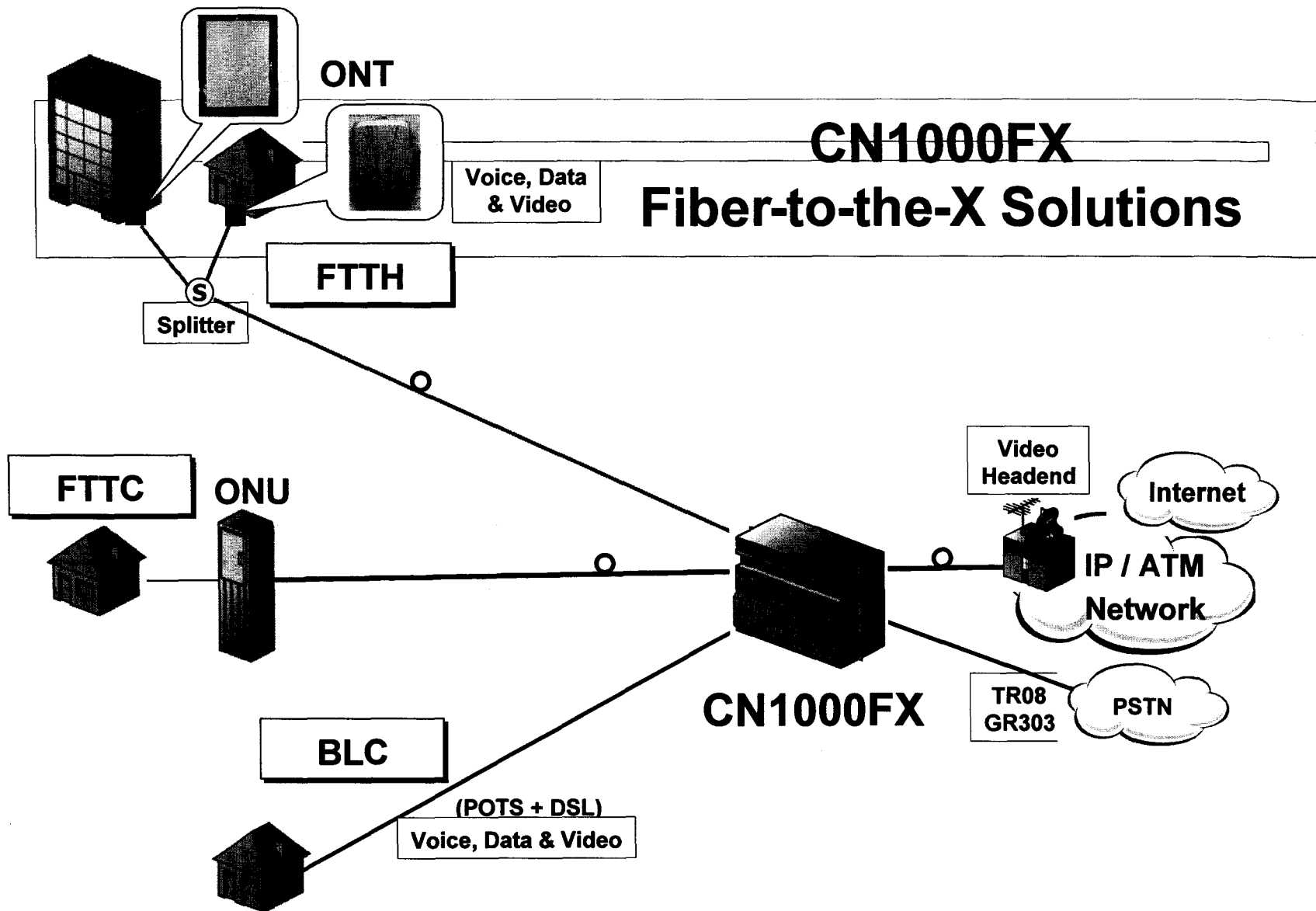
NETWORKS
CATENA

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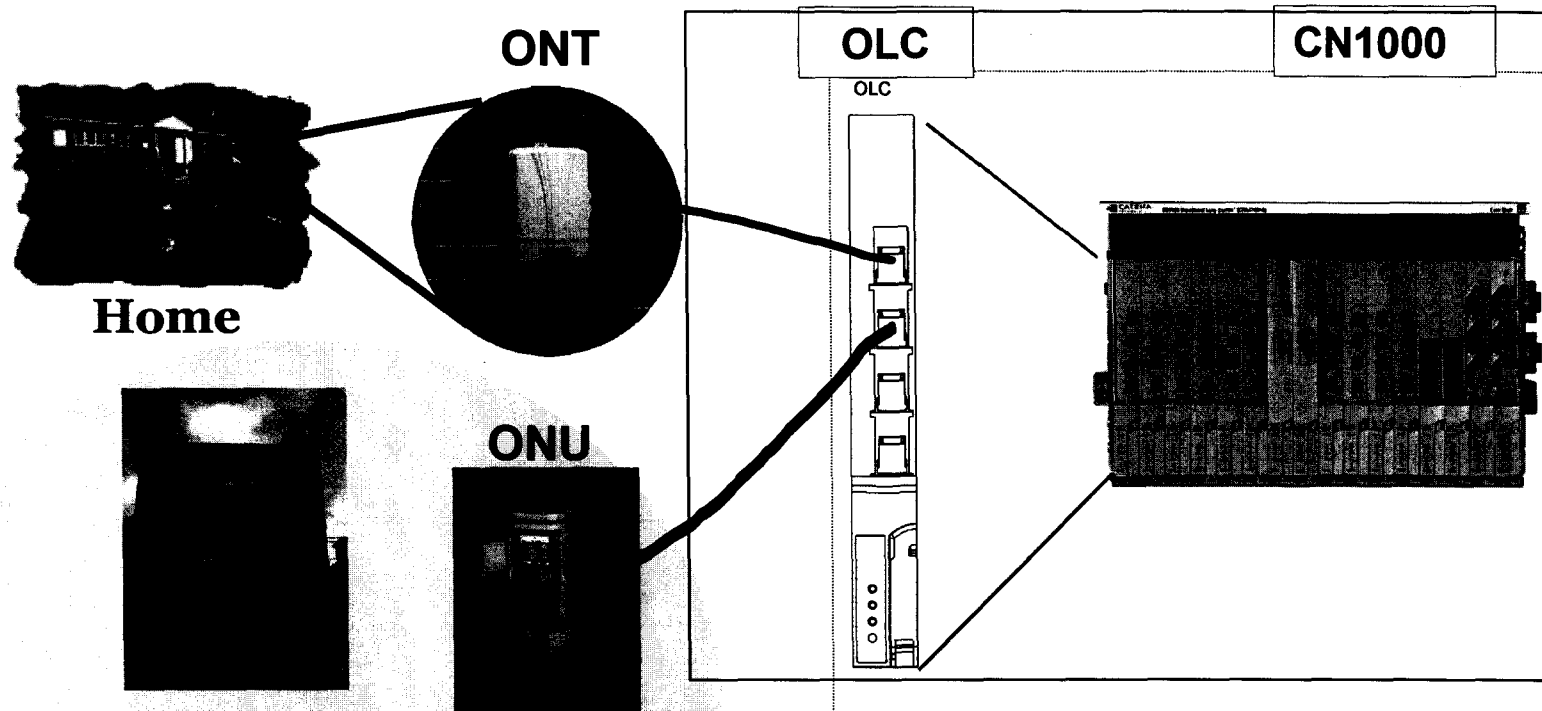
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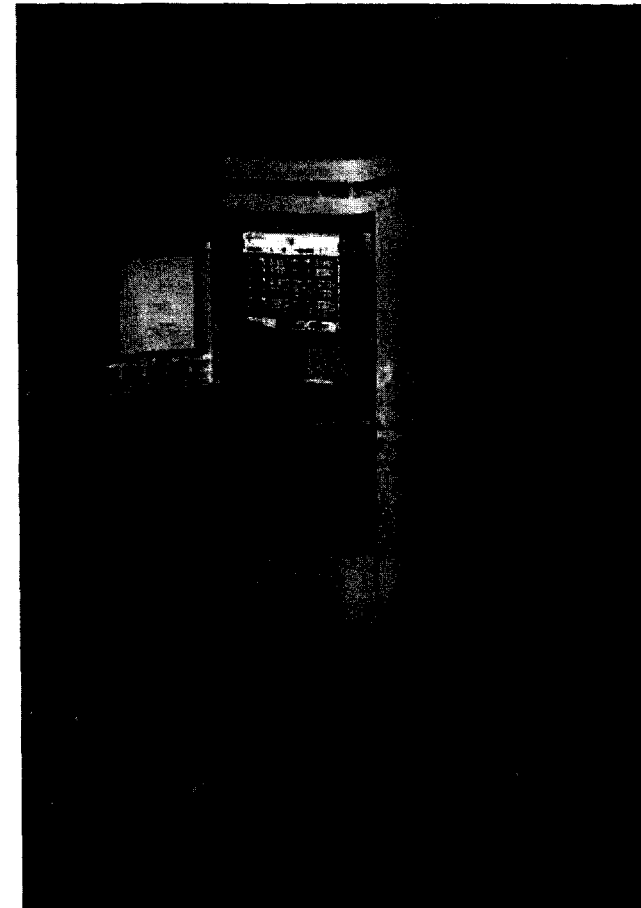- **Same broadband service set**

CATENA NETWORKS

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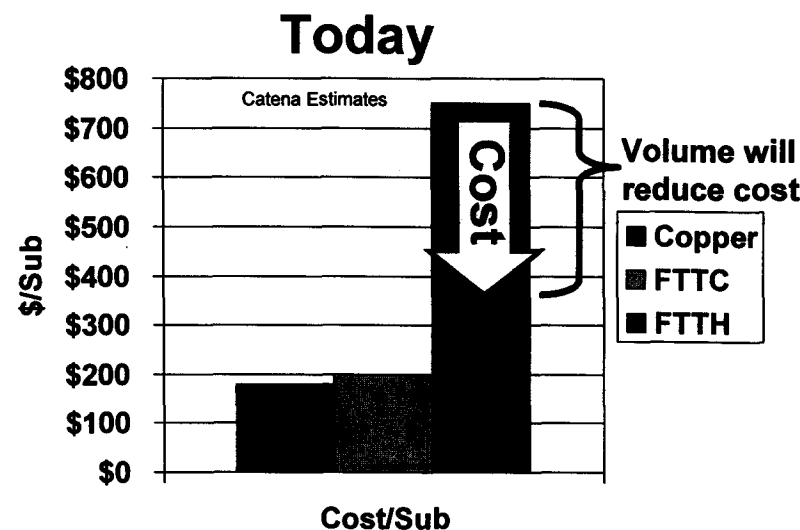- ADSL, ADSL 2+, G.SHDSL, VDSL, etc.
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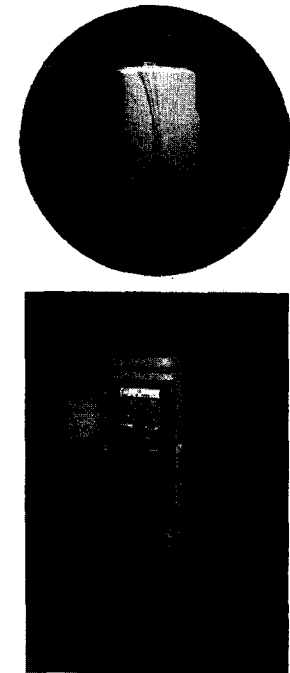 - Electronics (ONT) amortized over single (1) living unit

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